REMARKS

This application has been carefully reviewed in light of the Examiner's action dated December 6, 2005. Claims 1, 9, 10, 12, 15, 16-23, 30 and 31 have been amended and claims 8 and 35-42 have been cancelled, without prejudice. Reconsideration and full allowance are respectfully requested.

The Examiner rejected claims 17 and 18 under 35 U.S.C. §112 second paragraph for reasons not addressed to patentability of the subject matter addressed thereby. Applicant has amended the dependency of claims 17 and 18 and it is believed that this rejection has been overcome.

Claims 15 and 16 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,259,033 to Goodings. As set forth below, all the claims are believed to be allowable as presented and therefore, this rejection is respectfully traversed. The noted claims include independent claim 15.

Independent claim 15 provides a method for using a hearing aid that allows for compensating for changing frequency response characteristics of a microphone to acoustic inputs. The method includes conducting a test session to determine a current frequency response of a microphone. The current frequency response of the microphone is compared to a previously determined frequency response to identify differences in those frequency responses. At least one test parameter is generated that is representative of the differences between the current frequency response and the previously determined frequency response. The test parameter may then be utilized to generate drive signals for a transducer to compensate for differences in the frequency responses of the microphone. For instance, if physiological conditions change between test sessions, the test parameters may be utilized to adjust one or more frequencies of the current frequency response such that the adjusted frequency responses are similar to corresponding frequency of the predetermined frequency response (e.g., a calibration response of the microphone). Stated otherwise, the system may determine and apply one or more delta factors to a current frequency response to match the current frequency response to a previously determined frequency response.

As set forth in the application, it has been recognized that over time the response of an implanted microphone to acoustic stimulation (e.g., acoustic signals) may change. For instance,

changes in the tissue surrounding an implanted microphone can change the response (e.g., frequency response) of the microphone to acoustic signals. In this regard, changes to thickness, density and/or compliance of the tissue may occur following the implant of the microphone. These changes may directly affect the sound received in the microphone and, accordingly, may result in the frequency response or output of the microphone being altered.

In this regard, claim 15 provides a method where a test session is performed to determine the current frequency response of the microphone, which is then compared to a previously determined frequency response. Accordingly, if differences or changes exist between the frequency responses such identified changes may be utilized to compensate the frequency response (i.e., output signal) of the microphone. This compensation (e.g., a correction or delta value) for the frequency responses may then be utilized on a going forward basis to generate drive signals for the transducer that account for changes to the frequency response of the microphone.

In contrast, Goodings is directed towards a hearing aid system that is adapted to suppress acoustic feedback. That is, Goodings attempts to reduce acoustic feedback in the output signal of a receiver (i.e., receiving microphone 5 of Figure 1) where such feedback results from acoustic coupling between the microphone (i.e., output microphone 11 of Figure 1) and the receiver. See Column 3 lines 58-61. In this regard, Goodings utilizes an adaptive filter to model an internal or electrical feedback path (i.e., path 'm' of Figure 1) with an external or acoustic feedback path (i.e., dotted line 'w' of Figure 1) such that the modeled signal 'm' may be subtracted (i.e., using digital adder 23 of Figure 1) from the receiver output to suppress feedback. In this regard, Goodings generates a cancellation signal and combines that cancellation signal to the receiver output to suppress acoustic feedback. That is, Goodings generates two concurrent signals and combines those signals to suppress feedback

Goodings does not disclose, inter alia, determining a current frequency response of a microphone or comparing the current frequency response of the microphone to a previously determined frequency response of the microphone. Accordingly, Goodings does not identify differences between a current frequency response and a predetermined frequency response in order to identify differences. Applicant can find no reference of Goodings making comparisons of temporally distinct microphone frequency responses. Further, Goodings does not utilize differences between temporally distinct frequency responses to generate a test parameter that

may subsequently be utilized to generate drive signals that compensate for differences in the frequency responses of the microphone.

Goodings failure to disclose or even suggest comparing a current microphone frequency response to a previously determined frequency response is not surprising as Goodings is directed to external hearing aids (e.g., behind-the-ear, in-the-canal and in-the-ear hearing aids; see Column 1 lines 10-16). In such external hearing aids the receiving microphone of the hearing aid is exposed to air and environment in which the microphone receiver works does not change over time. For instance, there is no tissue growth or thickening of tissue disposed over the receiving microphone. Likewise, the frequency response of the receiving microphone to acoustic stimulation would not be expected to change. For these reasons, Goodings fails to recognize or address the problem addressed by the system of Claim 15, namely, changed response of the receiving microphone to acoustic stimulation over time due to, for example, changes in microphone environment. Accordingly, Applicant submits that independent claim 15 is allowable as presented and requests that this rejection be withdrawn.

Claims 1-14 and 18-34 were rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Patent No. 5,259,033 to Goodings. As set forth below, all the claims are believed to be allowable as presented and therefore, this rejection is respectfully traversed. The noted claims include independent claims 1 and 23.

Initially applicant notes that dependent claims 18-22 depend from an allowable base claim (i.e., claim15) and are therefore allowable.

As presented, independent Claim 1 is directed to a hearing aid that allows for monitoring the operational characteristics of an implantable microphone associated with the hearing aid. The hearing aid includes a transducer that is implantable within a patient to stimulate a component of an auditory system and an implantable microphone that is operative to subcutaneously receive and process acoustic sounds to generate frequency responses representative of those acoustic sounds. The hearing aid also includes a signal processor operative to process at least one feedback frequency response from the implantable microphone in order to identify changes between the at least one feedback frequency response and a previously determined frequency response. The processor is further operative to generate at least one test parameter based on the identified changes and use the at least one test parameter to

change subsequent acoustic frequency responses of the implantable microphone that are generated in response to acoustic sounds.

The feedback frequency response is generated by the implantable microphone in response to sound that results from the actuation of the implantable transducer. As may be appreciated, a common test signal may be applied to the transducer periodically such that temporally distinct acoustic feedback frequency responses may be generated. By applying the same test parameter at two temporally distinct times, it may be expected that acoustic feedback would be the same absent changes to the operating characteristics or environment of the microphone (e.g., tissue growth). As presented, the system of Claim 1 allows for monitoring changes to the operating characteristics and/or environment of the microphone and accounting for such changes in subsequent frequency responses of the microphone. That is, the system of Claim 1 utilizes acoustic feedback in order to monitor the operation of the microphone.

In contrast, Goodings attempts to suppress acoustic feedback in an output of a receiving microphone by concurrently generating a cancellation signal and a microphone output signal and combining those signals. Goodings fails to disclose or suggest the use of acoustic feedback for purposes of monitoring the operating characteristics of the microphone over time (e.g., to identify changes in the operating characteristics). For instance, Goodings does not utilize acoustic feedback to generate a feedback frequency response of an implanted microphone and compare that feedback frequency response with a predetermined frequency response of the microphone. Therefore, Goodings cannot determine changes in the frequency response of the microphone or adjust subsequent frequency responses of the microphone to account for such changes. Accordingly, Applicant submits that independent Claim 1 is allowable over Goodings and respectfully requests that this rejection be withdrawn.

Independent Claim 23 is directed to a hearing aid that includes a transducer that is implantable within a patient to stimulate a component of an auditory system and an implantable microphone that transcutaneously receives and processes acoustic sounds. In response to such transcutaneously received sounds the implantable microphone is operative to generate frequency responses. The hearing aid further includes a signal processor to process at least one feedback frequency response from the implantable microphone and compare the at least one feedback frequency response with a reference frequency response. Based on this comparison, the processor is operative to generate drive signals for the transducer that compensate for changed characteristics of the microphone frequency response.

Again, the system of Goodings fails to disclose or suggest subject matter of Claim 23. Specifically, and as noted above, Goodings fails to utilize feedback frequency response in the operation of an implanted transducer in order to measure an operating characteristic of an implantable microphone or to compare that operating characteristic of the microphone to a previously determined operating characteristic. Accordingly, Goodings cannot generate drive signals that compensate for changed characteristics of a microphone responses as presented in Claim 23. As such, Applicant respectfully submits that this rejection should be withdrawn and requests that Independent Claim 23 and its dependent claims be allowed.

Based upon the foregoing, Applicant believes that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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